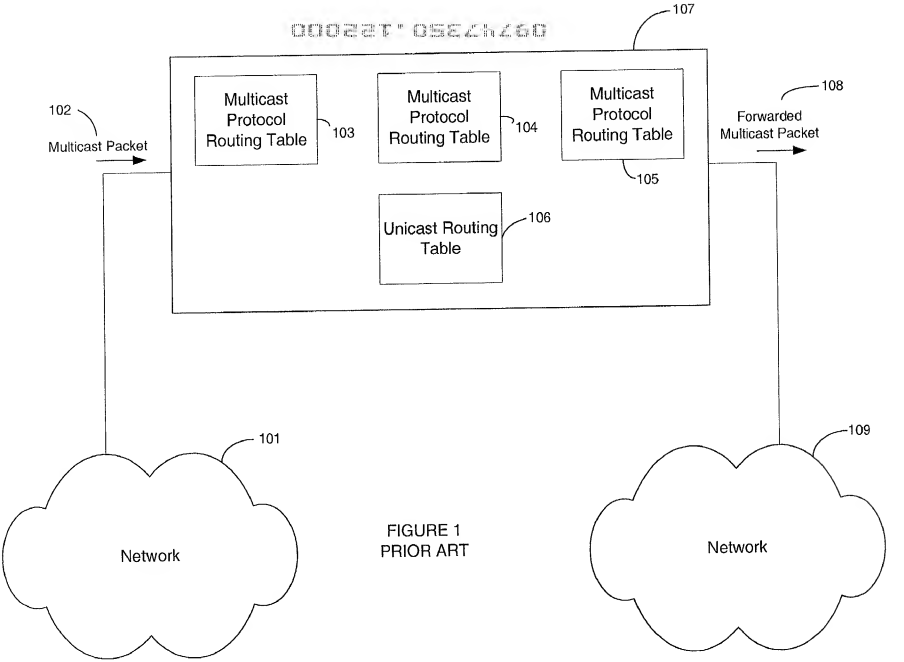

FIGURE 1
PRIOR ART

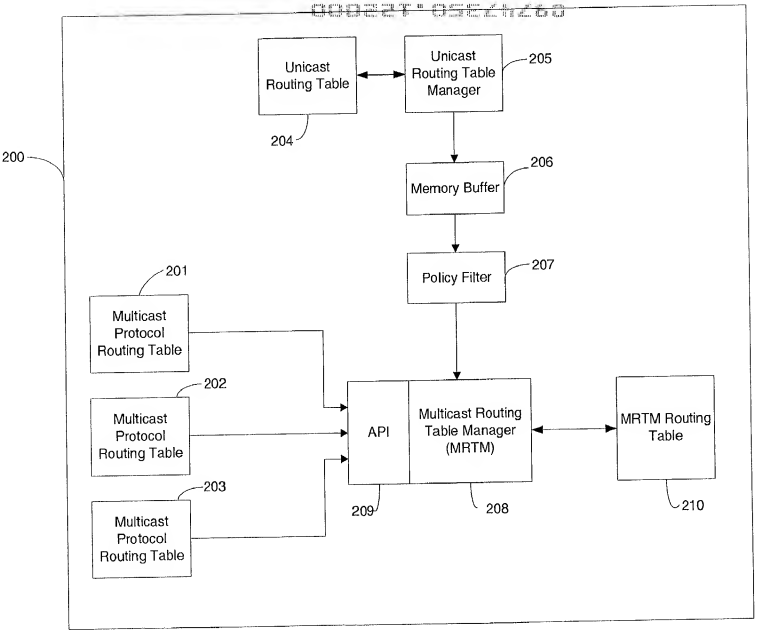
Unicast Routing Table
Unicast Routing Table Manager
205
204
200
Memory Buffer
206
Policy Filter
207
201
Multicast Protocol Routing Table
202
Multicast Protocol Routing Table
203
Multicast Protocol Routing Table
API
Multicast Routing Table Manager (MRTM)
MRTM Routing Table
209
208
210

FIGURE 2

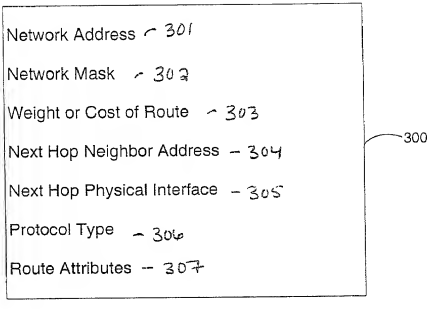
Network Address 301
Network Mask 302
Weight or Cost of Route 303
Next Hop Neighbor Address 304
Next Hop Physical Interface 305
Protocol Type 306
Route Attributes 307
300

FIGURE 3

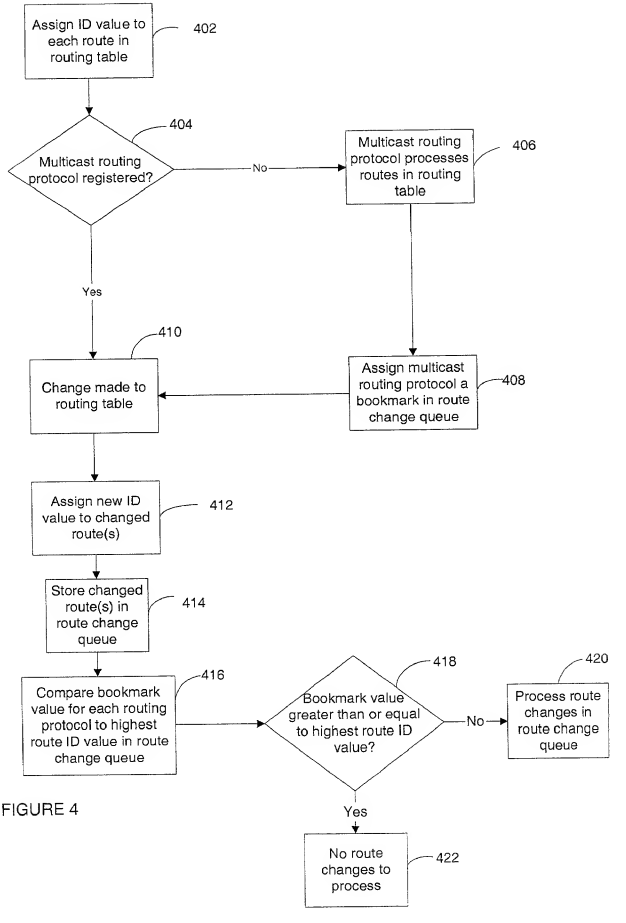

FIGURE 4

```
wfIpMrtmInjectRtTable OBJECT-TYPE
        SYNTAX  SEQUENCE OF WfIpMrtmInjectRtEntry
        ACCESS  not-accessible
        STATUS  mandatory
        DESCRIPTION
                "The Table of MRTM Inject Unicast routes Policy Rules"
        ::= { wfIpPolicyGroup 21 }


wfIpMrtmInjectRtEntry OBJECT-TYPE
    SYNTAX  WfIpMrtmInjectRtEntry
    ACCESS  not-accessible
    STATUS  mandatory
    DESCRIPTION
            "An entry in the Mrtm Inject Route Rule Table"
    INDEX   { wfIpMrtmInjectRtIndex }
    ::= { wfIpMrtmInjectRtTable 1 }

WfIpMrtmInjectRtEntry ::= SEQUENCE {
        wfIpMrtmInjectRtDelete
            INTEGER,
        wfIpMrtmInjectRtDisable
            INTEGER,
        wfIpMrtmInjectRtIndex
            INTEGER,
        wfIpMrtmInjectRtName
            DisplayString,
        wfIpMrtmInjectRtNetworks
            OCTET STRING,
        wfIpMrtmInjectRtAction
            INTEGER,
        wfIpMrtmInjectRtPreference
            INTEGER,
        wfIpMrtmInjectRtPrecedence
            INTEGER,
        wfIpMrtmInjectRtInject
            OCTET STRING,
        wfIpMrtmInjectRtInInterface
            OCTET STRING,
        wfIpMrtmInjectRtType
            INTEGER,
        wfIpMrtmInjectRtMetric
            INTEGER


  wfIpMrtmInjectRtDelete OBJECT-TYPE
      SYNTAX  INTEGER {
                  create(1),
                  delete(2)
              }
      ACCESS  read-write
      STATUS  mandatory
      DESCRIPTION
              "Create/Delete parameter."
      DEFVAL  { create }
     ::= { wfIpMrtmInjectRtEntry 1 }
```

FIGURE 5A

```
wfIpMrtmInjectRtDisable OBJECT-TYPE
    SYNTAX  INTEGER {
                enabled(1),

                disabled(2)
            }
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "Enable/Disable parameter."
    DEFVAL  { enabled }
    ::= { wfIpMrtmInjectRtEntry 2 }



  wfIpMrtmInjectRtIndex OBJECT-TYPE
      SYNTAX  INTEGER
      ACCESS  read-only
      STATUS  mandatory
      DESCRIPTION
              "Rule index number"
      ::= { wfIpMrtmInjectRtEntry 3 }



wfIpMrtmInjectRtName OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "Rule name - user specified name for this rule"
    ::= { wfIpMrtmInjectRtEntry 4 }



wfIpMrtmInjectRtNetworks OBJECT-TYPE
    SYNTAX  OCTET STRING
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "Network identification list. This identifies which
            networks will match this rule.  If non-null, The octet
            string contains one or more 3-tuples of this form:

             first octet:  exact (1) or range (2)
             next 4 octets: network number
             next 4 octets: network mask


            An entry with an 'exact' tag means to only match the
            specific network advertisement (number & mask).  An
            entry with a 'range' tag means to match any network
            number that falls in the range indicated by the number
            and mask.

            A null string also means 'match any route'."

    ::= { wfIpMrtmInjectRtEntry 5 }
```

FIGURE 5B

```
    wfIpMrtmInjectRtAction OBJECT-TYPE
        SYNTAX  INTEGER {
                    accept(1),
                    ignore(3)
                }
        ACCESS  read-write
        STATUS  mandatory
        DESCRIPTION
                "action. 'accept' means that the route should be

                imported from RTM to  the Mrtm routing table.  'ignore'
                means don't consider the route"
        DEFVAL  { accept }
        ::= { wfIpMrtmInjectRtEntry 6 }



wfIpMrtmInjectRtPreference OBJECT-TYPE
    SYNTAX  INTEGER(0..16)
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "preference. This is a metric to be used to compare
            the preference path between inject route or the existing
            route in Mrtm routing table. If the injecting unicast
            route is preferred, then the value need to be set higher than
            the preference of the existing route.
            If the injecting unicast route path is preferred,
                            then the value need to be set greater than 0.
            This parameter only has meaning if the action is 'accept'."
    DEFVAL  { 1 }
    ::= { wfIpMrtmInjectRtEntry 7 }


wfIpMrtmInjectRtPrecedence OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "precedence. This is a metric to be used to compare
            this policy rule to other rules that a given route may
            match.  A rule with a higher precedence value will be
            chosen over one with a smaller value.  In the case of
            a tie, the rule index is used (larger wins).

            Note that the policy match is not most specific
            so the precedence has to be used to select from
            multiple matches."
    ::= { wfIpMrtmInjectRtEntry 8 }
```

FIGURE 5C

```
wfIpMrtmInjectRtInject OBJECT-TYPE
    SYNTAX  OCTET STRING
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "network injection list. this octet string should only be
            non-null if the action is 'accept' and if it is desired to
            insert networks into the routing table that differ from
            the actual advertised network.  For instance, if a number of
            networks in a certain range are learned, an aggregate
            advertisement could be inserted instead of the individual
            networks.

            If non-null, The octet string contains one 2-tuples of
            this form:

            first 4 octets: network number
            next  4 octets: network mask

            Upon receiving a route that matches this filter, the network
            in this list will be considered for inclusion in the routing
            table.  If the list is null, the actual received network is

            considered."
    ::= { wfIpMrtmInjectRtEntry 9 }



wfIpMrtmInjectRtInInterface OBJECT-TYPE
    SYNTAX  OCTET STRING
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "Injected unicast routes inbound circuit list.
            This octet string contains one or more 4-octet IP addresses.
            If an interface address is included in this list, the unicast
            routes received on that interface match this rule will be
            accepted.

            If null, this filter applies to unicast routes received on
            any interface."
    ::= { wfIpMrtmInjectRtEntry 10 }
```

FIGURE 5D

```
wfIpMrtmInjectRtType OBJECT-TYPE

    SYNTAX  INTEGER {
             static-route(1),
             rip(15),
             egp(16),
             ospf(17),
             bgp(18),
             direct-route(40),
             best-route(41),
             all-route(42)
            }
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "Select the injected route type from RTM. The value of each
             route type will be the same as unitcast route type. See
             define in ip_rt_types.h"
    DEFVAL  { best-route }
    ::= { wfIpMrtmInjectRtEntry 11 }



wfIpMrtmInjectRtMetric OBJECT-TYPE
    SYNTAX  INTEGER (1..31)
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "Route Metric. This value represents the cost of the external
             routes which are OSPF or unicast best route  to be injected
             into Mrtm routing table. The default value is set to 1."

    DEFVAL  { 1 }
    ::= { wfIpMrtmInjectRtEntry 12 }



wfMrtm      OBJECT IDENTIFIER ::= { wfMrtmGroup 1 }


wfMrtmCreate OBJECT-TYPE
    SYNTAX  INTEGER {
                created(1),
                deleted(2)
            }
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "Create/Delete parameter. Default is created.
            Users perform a set operation on this
            object in order to create/delete MRTM table."
    DEFVAL  { created }
    ::= { wfMrtm 1 }
```

FIGURE 5E

```
wfMrtmEnable OBJECT-TYPE
    SYNTAX  INTEGER {
            enabled(1),
            disabled(2)
            }
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "Enable/Disable Parameter indicates whether
            this MRTM record is enabled or disabled."
    DEFVAL  { enabled }
    ::= { wfMrtm 2 }


wfMrtmState OBJECT-TYPE
    SYNTAX  INTEGER {
                up(1),
                down(2),
                init(3),
                notpres(4)
            }
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION
            "The current state of the entire MRTM."
    DEFVAL  { notpres }
    ::= { wfMrtm 3 }


wfMrtmDebug OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "This is a debug field for PGM. Setting bits
            cause PGM to generate certain log messages.
            This field will NOT restart PGM.
            The follow bits maybe set in any combination
            (LS stands for least significant):

            0x00000001 for no display
            0x00000002 for interface to RTM
            0x00000004 for interface to policy
            0x00000008 for interface to multicast protocols
            0x00000010 for route change or add or delete.
    ::= { wfMrtm 4 }
```

FIGURE 5F

```
wfMrtmHoldDownTime OBJECT-TYPE
    SYNTAX  INTEGER(10..60)
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION

        "This value specifies, in seconds, how long a route
        will be held in MRTM table after it becomes unreachable."
DEFVAL  { 10 }
::= { wfMrtm 5 }


wfMrtmFifoSize OBJECT-TYPE
SYNTAX  INTEGER(1..100)
ACCESS  read-write
STATUS  mandatory
DESCRIPTION
        "This value represents the depth of the FIFO
         between RTM and MRTM used for the outstanding route changes.
         The memory will be pre-allocated as the size of
         x times 1000 of FIFO route entry."
DEFVAL  { 5 }
::= { wfMrtm 6 }


wfMrtmEstimatedNetworks OBJECT-TYPE
    SYNTAX  INTEGER(10..200000)
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "This parameter indicates the estimated number of routes
            per slot that the router will need to keep in its routing
            table.This value is used for pre-allocating routing tables."
    ::= { wfMrtm 7 }


wfMrtmMaxRoutes OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
            "Max number of routes, per slot. This is used to limit
            the size of routing tables. Note that routes are kept on a
            per-source network basis, independent of multicast group."
    ::= { wfMrtm 8 }


wfMrtmActualRoutes OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION
            "Total actual entries currently in the routing table"
    ::= { wfMrtm 9 }
```

FIGURE 56